Spot Safety Project Evaluation

Project Log # 200501259

Spot Safety Project # 01-97-223

Spot Safety Project Evaluation of the Vehicle Entering When Flashing Traffic Signal Installation, at the Intersection of US 17-158 and SR 1333 (Main Street Extended), in Pasquotank Co.

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 09/20/2005
Samuel D. Coleman Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-97-223 – The Intersection of US 17-158 and SR 1333 (Main Street Extended) in Pasquotank Co.

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis of the treatment versus comparison data has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a vehicle entering when flashing traffic signal. US 17-158 is a four-lane divided facility with left turn lanes at the intersection of SR 1333 (Main Street Extended). SR 1333 (Main Street Extended) is a two-lane facility with no left-turn lanes. All approaches have a 45-mph speed limit at this intersection. The intersection was controlled by dual stop signs on SR 1333 in the before period. Please note that background information was not included in the project folder. All the information presented was gathered from field visits and crash reports. The final completion date for the vehicle entering when flashing traffic signal installation at the subject intersection was on March 26, 1998.

Naive Before and After Analysis

After reviewing all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from February 1998 through April 1998. The before period consisted of reported crashes from October 1, 1994 through January 31, 1998 (3 Years, 4 Months) and the after period consisted of reported crashes from May 1, 1998 through August 31, 2001 (3 Years, 4 Months) due to a traffic signal installation in the 4th quarter of 2001. The ending date for this analysis was determined by the last crash report in the after period indicating a flashing signal as a traffic control device. The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet at the signalized intersection of US 17 at US 158/SR 1416/Northside Rd. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. These crash types

considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	14	27	92.9
Total Severity Index	7.3	8.7	19.1
Frontal Impact Crashes	14	24	71.4
Frontal Severity Index	7.3	9.7	32.3
Volume	14600	16200	11.0

Comparison Information

	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	10	8	-20.0
Total Severity Index	6.2	14.2	129.4
Frontal Impact Crashes	6	1	-83.3
Frontal Severity Index	7.2	76.8	971.1
Volume	13000	14000	7.7

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-) Percent Increase (+)
Treatment Total Crashes	14	27	**141.1**
Comparison Total Crashes	10	8	
Treatment F.I. Crashes	14	24	**928.6**
Comparison F.I. Crashes	6	1	

The naive before and after analysis at the treatment location resulted in a 92.9 percent increase in Total Crashes, a 71.4 percent increase in Frontal Impact Crashes, and an 11.0 percent increase in Average Daily Traffic (ADT). The comparison locations resulted in a 20.0 percent decrease in Total Crashes, an 83.3 percent decrease in Frontal Impact Crashes, and a 7.7 percent increase in ADT. The before period ADT year was 1996 and the after period ADT year was 2000.

The Odds Ratio is used as another means of calculating the treatment effect. The total crashes in the before and after period from the Comparison Intersection are used to calculate the percent reduction in total crashes for the Treatment Intersection. As shown in the table above, using the Odds Ratio calculation, there is a 141.1 percent increase in Treatment Intersection crashes and a 928.6 percent increase in Frontal Impact crashes.

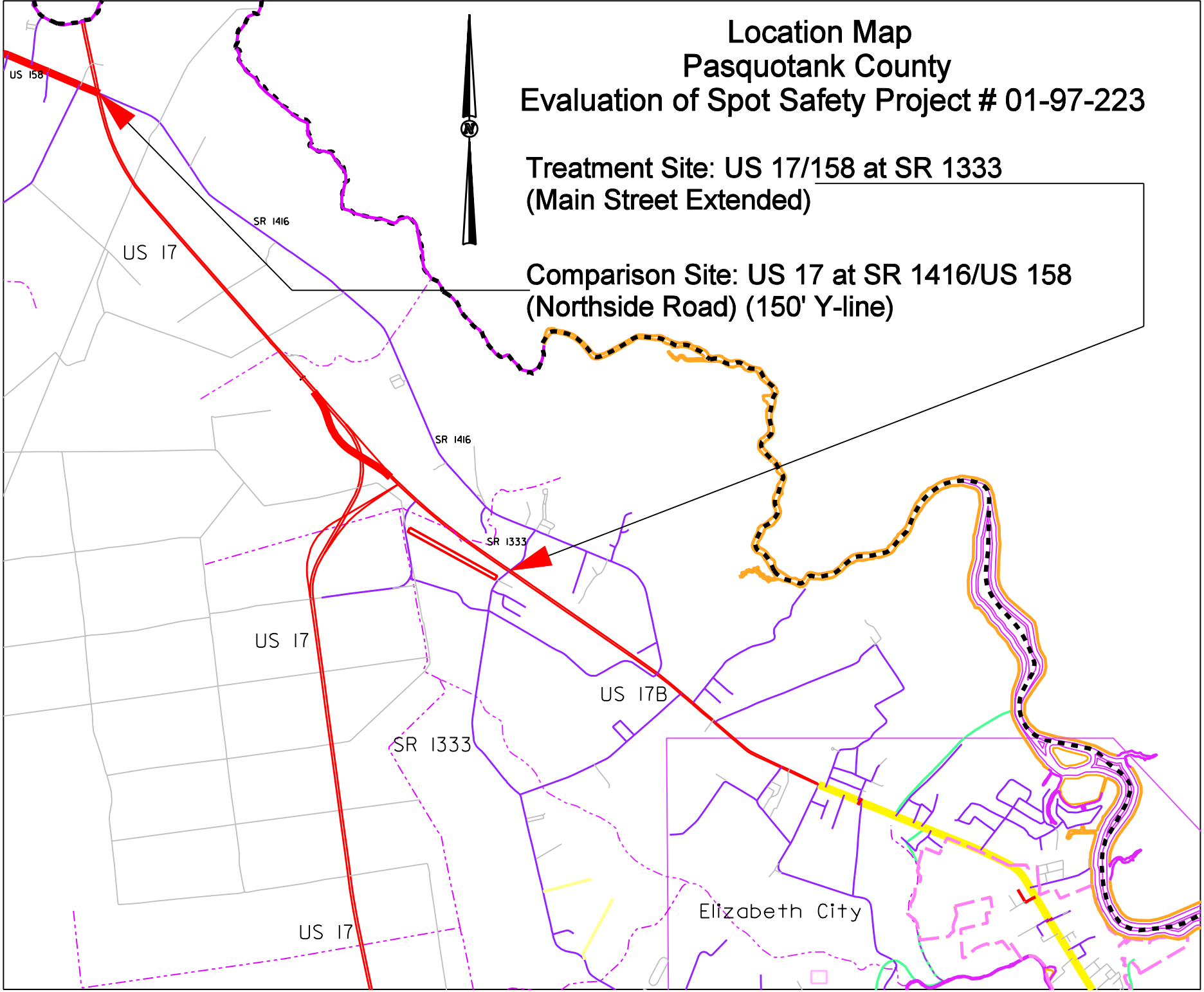
Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 92.9 percent increase in Total Crashes and a 71.4 percent increase in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 141.1 percent decrease in Total Crashes at the Treatment Intersection and a 928.6 percent decrease in Frontal Impact crashes. The summary results above demonstrate that the treatment location appears to have had an increase in the number of Total Crashes and an increase in the number of Frontal Impact Crashes from the before to the after period.

Referencing the table and collision diagrams, there doesn't seem to be any specific factor contributing to the significant crash increase at the treatment intersection. The ADT did not have an abrupt increase and there is not much evidence in the collision diagrams to support stop sign violations. There may be an outside cause for the increase in crashes, which may be a lack of understanding for the vehicle entering when flashing signal by the drivers.

Referencing the collision diagrams, there is a concentrated increase of crashes in three areas: the top right, bottom left and bottom right quadrants. A majority of the crashes happened after the driver has cleared the first half of US 17/158, resulting in far side intersection crashes. This may suggest that drivers are attempting to cross the entire highway without pausing at the median.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 92.9 to a 141.1 percent increase in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 71.4 to a 928.6 percent increase in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.



location map.dgn 11/10/2005 05:16:19 PM

Treatment Site Photos August 20, 2005

US 17/158 Driving North

US 17/158 Driving South

SR 1333 Driving East

On SR 1333 East Looking North

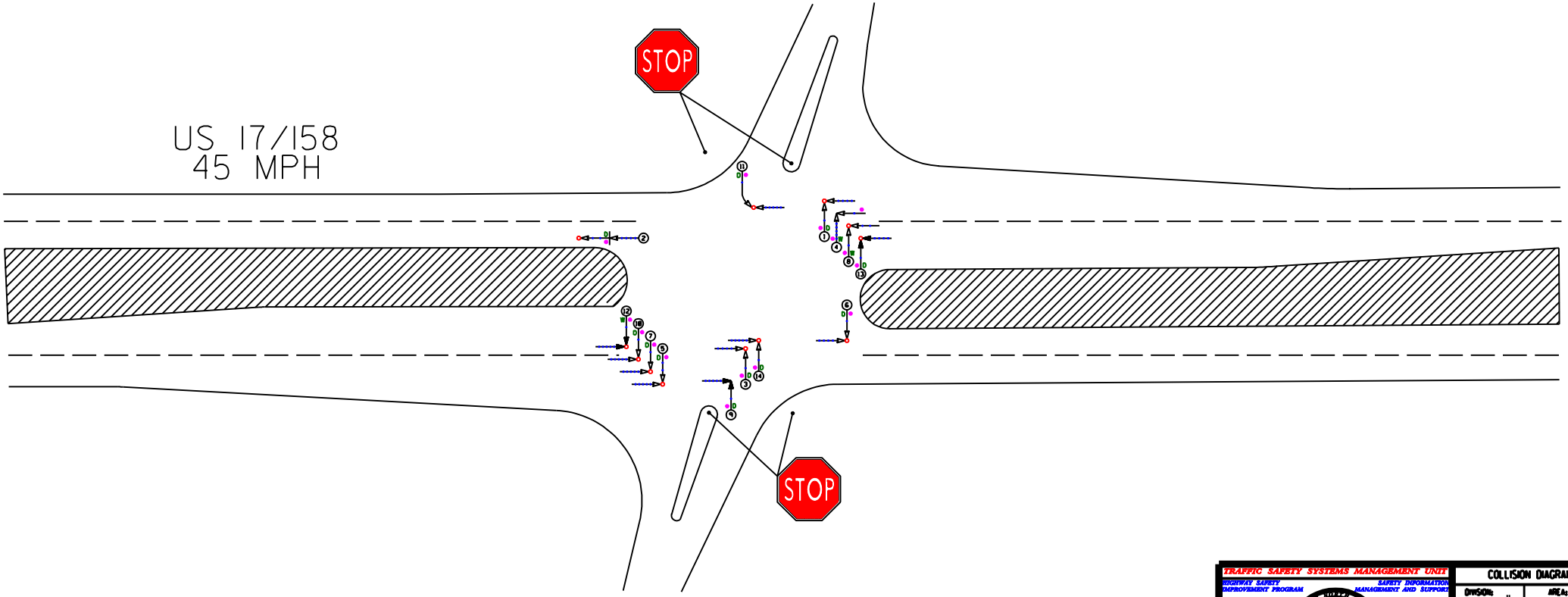
On SR 1333 East Looking South

SR 1333 Driving West

On SR 1333 West Looking North

On SR 1333 West Looking South

Treatment Site - Total Crashes
Before Period
October 1, 1994 - January 31, 1998
(3 years 4 months)
Pasquotank County



LEGEND

P PEDESTRIAN
B BICYCLE
T TRAIN
A ANIMAL
O OTHER AT FAULT
D DRY
W WET
I ICY OR SNOWY

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
HIGHWAY SAFETY IMPROVEMENT PROGRAM
SAFETY INFORMATION MANAGEMENT AND SUPPORT
SAFETY EVALUATION
TRAFFIC SAFETY

COLLISION DIAGRAM

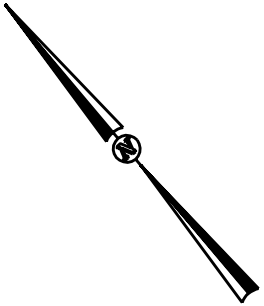
DIVISION: .. AREA: ..
STUDY PERIOD: 10/1/1994 TO 1/31/1998
DISTANCE: ..... Y-LINE: 150 FT
ANALYSIS PREPARED BY: S.COMBOS
DIAGRAM PREPARED BY: S.COMBOS
DIAGRAM REVIEWED BY: .....

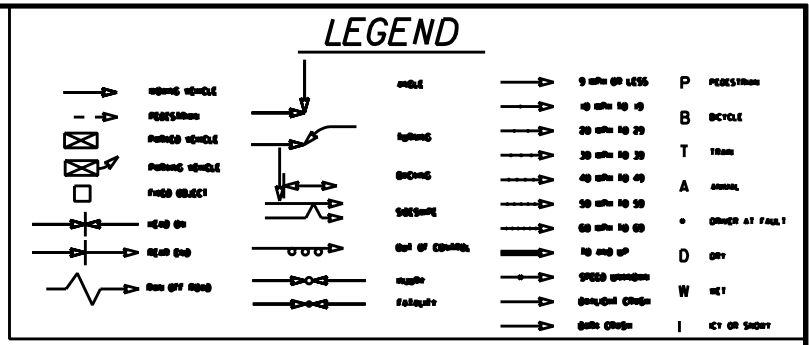
BEFORE FLASHER INSTALLATION

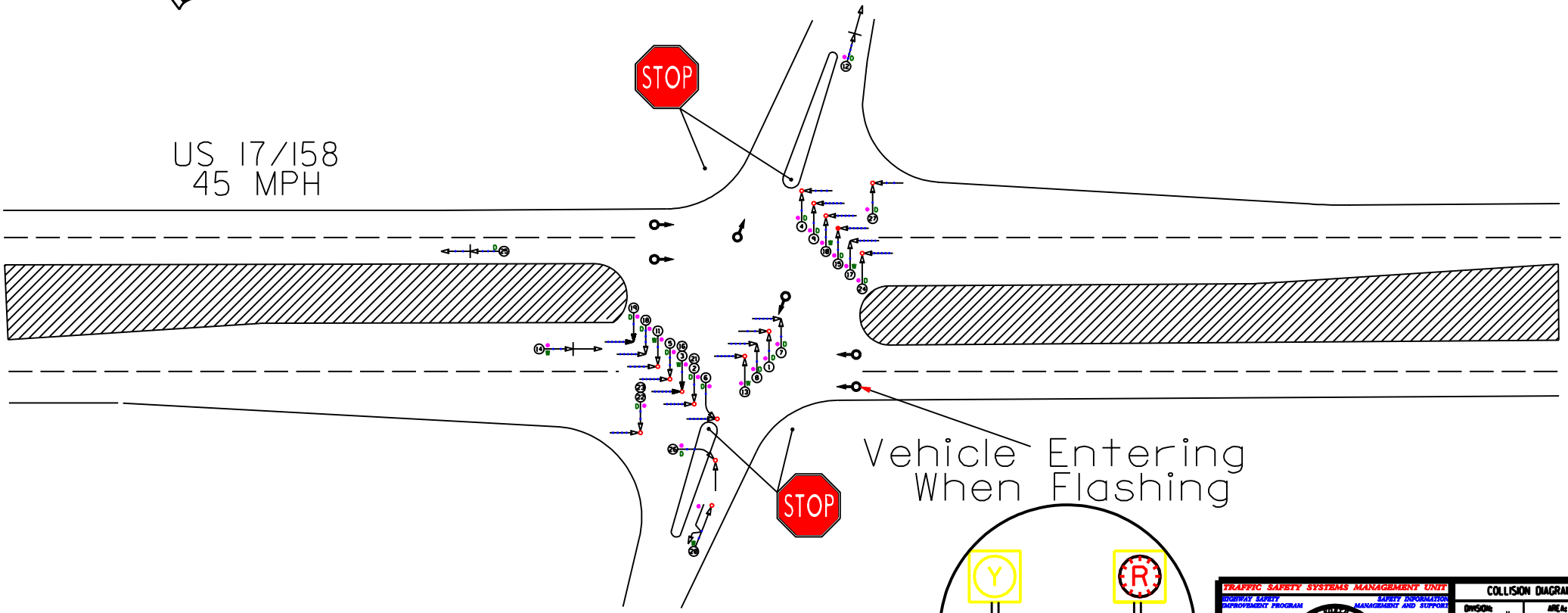
SCALE: NOT TO SCALE
DATE: September 2005
LOG NUMBER: .....

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

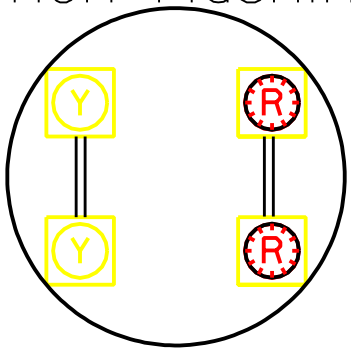
Treatment Site - Total Crashes
After Period
May 1, 1998 - August 31, 2001
(3years 4 months)
Pasquotank County







Vehicle Entering
When Flashing



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY IMPROVEMENT PROGRAM

SAFETY INFORMATION MANAGEMENT AND SUPPORT

SAFETY EVALUATION

TRAFFIC SAFETY

COLLISION DIAGRAM

DIVISION: .. AREA: ..

STUDY PERIOD: 5/1/1998 TO 8/31/2001

DISTANCE: ..... T-LINE: 150 FT

ANALYSIS PREPARED BY: S.Cowgill

DIAGRAM PREPARED BY: S.Cowgill

DIAGRAM REVIEWED BY: .....

AEIER.FLASHER.INSTALLATION

SCALE: NOT TO SCALE

DATE: September, 2005

DG NUMBER: .....

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

collision diagram.dgn 11/17/2005 10:41:42 AM